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THE EVOLUTIONARY SIGNIFICANCE OF HUMAN CHARACTER.[1]

BY E. D. COPE.

THE complicated constitution of the human mind is well impressed on the investigator as he seeks to understand the origin of any one of the many different types of character which come before him. The number of possible combinations of its numerous elements, each of which present developmental phases, is necessarily very great. The *species* of human minds, as one may properly term them, are probably as numerous as the species of animals, as defined by their physical structure. As in the case of anatomical species, however, analysis of the mind reduces its many details to a few leading departments. Although the classification of the elements of the mind is a classification of functions; it is, if correct, a sure index of the classification of structure also; of the grosser and more minute structure of the brain, principally of the gray matter.

The division of mental activities into three primary divisions is generally admitted. These are: the emotions, the intellect and the will. The emotions include the likes and dislikes, or the tastes, and their strongest forms, the emotions and the passions. The intellect includes those powers which rearrange the experiences in an order different from that in which they enter the mind. This new order may have sole reference to questions of liking and disliking, and is then a product of the imagination; or it may be a result of experience of the laws of pure necessity, without regard to questions of taste; then it is a process of reason. The will, properly so-called, is the spontaneous power of the mind by which the other processes are originated, directed or restrained. The range of the will, and even its existence, are questions of dispute.

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[1] The present article is in continuation of the previous one on the Evolutionary Significance of Human Physiognomy, published in the NATURALIST of June, 1883.

Below and behind these mental activities lies *sensibility* or consciousness, in its forms of general and special sensation; that is, touch, and hearing, taste, smell, sight, and the muscular sense, with many others, concomitants of both health and disease. It is well understood that these primitive mental qualities are more or less developed in animals, in which the more purely mental functions are rudimental. The doctrine of evolution teaches that from this class the higher activities of the mind have been developed, during long ages, through the agency of memory. The nature of the present essay only permits a casual reference to the astonishing character of memory, and the remark that its phenomena demonstrate most clearly, of all others, that mind is an attribute of some kind of matter.

If we now consider these natural divisions of the mind as they present themselves in the combinations which we call human character, we shall observe a variety in the mode of their action which pervades all divisions alike. These variations fall under two heads, those of *quantity* and of *quality*.

Thus as to quantity; one human mind may present a greater amount of intellectual than emotional activity; of imaginative than rational intellection; of affectionate than irascible emotion; of gastronomic than musical taste, etc., etc. The quantity here indicated is probably an index of the proportion of brain tissue devoted to the functions mentioned. The intensity or force of the action is a matter of quality.

Of qualities the variety is much larger. They are often parallel to those of inorganic force, and suggest the same kind of modifications of the material bases, as those which effect the latter. Two prominent qualities are *fineness* and *coarseness*. Fineness observes and uses detail in both rational and emotive acts, and is essential to the precision of finish. Coarseness neglects detail, but deals with the gross of things, and is sometimes accompanied by largeness of quantity. When it is not, the result is not good. Fineness is, on the other hand, often associated with smallness. It is a more feminine attribute, while coarseness is more masculine.

Another pair of antithetic qualities are *intensity* of action and the reverse. This probably means that a given bulk of brain tissue produces a greater amount of energy in a given time than an equal bulk of non-intense tissue.

The *speed* or rate of action in time, and its opposite, slowness, are related to the last named qualities, but are not identical with them. Thus growth of the mind always witnesses a diminution in the rate of action, but an increase in intensity.

Tenacity of mental action is a very marked character, and of great importance. It signifies the persistence of mental action, or mental endurance, and may characterize the entire mind, or only a part of it. Its opposite, seen in changeability, desultoriness or fickleness, may also characterize all or a part only of the mind. According as it characterizes the intellectual or emotional departments, are its exhibitions most varied, though they probably have a common histological basis.

Impressibility and *stolidity* express antitheses of character which are seen every day. The term impressibility is used as identical with irritability, and is preferred, because the latter has special physiological and popular meanings, some of which are only among its phases. These qualities are apt to pervade the entire mental organism, although, like others, they may characterize a part only. Impressibility is obviously a condition of tissue, since it varies greatly with physiological conditions in the same person. Its exhibitions in the department of the emotions may be confounded with strong development of the emotions themselves. A moment's thought, however, shows that easy excitation of emotion is a different thing from energy of emotion, and is often found apart from it. Impressibility of intellect shares with tenacity a leading position as an attribute of a first-class mind, and the combination of the two, forms a partnership of superior excellence.

I may mention here a quality whose absence is pathological, and hence does not properly enter the field; this is *tonicity*. In its normal condition every organ should be supplied with sufficient nutriment or energy to ensure the occupation of its entire mechanism. Anything short of this is followed by poor work. Debility of mental action in the emotional department is seen in abnormal irritability, such as peevishness or "spooning;" and in the intelligence, in absence of mind and blundering; and in both, in general frivolity.

Returning to the primary elements of mind, we may examine their divisions with reference to the question of growth. To begin with the perceptions, there are great diversities in the acuteness of the general and special senses, and greater and less susceptibilities to physical pleasure and pain. In the important representative faculty memory, the differences between people are great. As perception as well as thinking involves a certain amount of structural change, it is evident that susceptibility or impressibility of the senses, which is the first stage of memory, signifies ready metamorphosis of tissue. Unimpressibility, which impedes memory, is a consequence of resistance on the part of tissue, to the usual stimuli. Hence the effect of "sights, sounds and sensations" is greatest in childhood, and the memory is most impressible, for at that time the nervous tissue is undergoing constant change, and nutrition being in excess of waste, constantly presents new material to be organized. And I may here refer to the general truth, that consciousness of all kinds is the especial and distinguishing attribute of life as distinguished from death or no life.[1] Whatever other phenomena we may be accustomed to regard as "vital," are only distinguishable from inorganic motion or force, because they primitively took their form under the guidance of consciousness, and are hence, so to speak, its children. With the perfect working of most of the mechanism of the body, consciousness no longer concerns itself, although it may speedily do so in pathological conditions. This prerogative is now restricted to the nervous system, and to certain parts of it; the one which is, histologically speaking, the most generalized of the systems. And it is quite consistent with the "doctrine of the unspecialized," that nervous tissue in its unfinished state in childhood should be more impressible to stimuli than at later periods of life. But this statement requires this modification, that there is a stage of imperfection of mechanism which does not display high sensibility, as for instance in the earliest infancy. With age sensibility gradually diminishes.

Next in order of appearance in growth are the emotions. It is true that some of these are not fully developed until long after the appearance of many or all of the intellectual faculties; but it is also true that their full development precedes that of the intellect, in so far as they are developed at all. The primitive condition of the emotions is that of appetites. The first of these in the necessary physiological order, and hence in time, is the appetite of hunger. Second in order in the history of life, but not in the growth of individuals, is the instinct of reproduction, such as it is in animals who only multiply by fission. Very early in evolution the emotion of fear must have arisen, and it is probably the immediate successor of hunger in the young of most animals. Anger appears as early as the mind can appreciate resistance to its first desires, and no doubt followed as third or fourth in the history of evolution. The rudiments of parental feeling would follow the origin of reproduction at a considerable interval of time. One of the latest of the instincts to appear, would be the love of power; while later still would be the emotions of relativity (Bain) because they are dependent on a degree of mental appreciation of objects. Such are admiration, surprise and wonder. These, as well as all other consequences of inherited intellect, appear earlier in infancy than they did in evolution, as may be readily understood.

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[1] The Origin of the Will, *Penn Monthly*, 1877, p. 440.

Of these instincts and emotions, it is to be supposed that hunger remains much as it has ever been. The reproductive instinct has, on the other hand, undergone the greatest modifications. Sex instinct could not have existed prior to the origin of the male sex, which must be regarded in evolution as a derivative from the female. Hence it is probable that the parental instinct preceded the sexual in time. These two instincts being the only ones which involve interest in individuals other than self, furnish the sources of sympathy in all its benevolent aspects. Hence it has developed in man into the powerful passion of love; into affection and charity in all their degrees and bearings. Fear being, as Bain shows, largely dependent on weakness, has varied in development in all times, but must be most pronounced in animals of high sensibility, other things being equal. Hence its power has, on the whole, increased until it probably reached its extreme in the monkeys or the lowest races of men. Increasing intelligence of the higher order diminishes the number of its occasions, so that it is the privilege of the highest types of men to possess but little of it. The earliest of the emotions of relativity to appear in time, has probably been the love of beauty; how early it may have appeared it is difficult to imagine. Surprise and wonder as distinct from fear, one can only conceive as following an advanced state of intelligence.

Thus in psychology as in physiognomy,[1] the palæontological order of development is somewhat different from the embryological. I might compare the two orders as follows :

PALÆONTOLOGICAL.	EMBRYOLOGICAL.
Hunger.	*Hunger.*
Reproduction.	*Fear.*
Fear.	*Anger.*
Anger.	*Beauty.*
Parental instinct.	*Wonder.*
Sex.	*Power.*
Power.	*Admiration.*
Beauty.	*Pity.*
Wonder.	*Sex.*
	Parental instinct.

The qualities enumerated in the first column follow each other directly in order from the simple to the complex. In the second column this order is disturbed by the earlier appearance of the derivative emotions, beauty, wonder, admiration and pity, or benevolence, and the later appearance of the simple emotion of sex. Thus in psychological as in other evolution, some of the products of development appear earlier and earlier in life in accordance with the law of *acceleration.*

The intelligence has already been considered under the two heads of the imagination and the reason. The action of the imagination, unmixed with the exercise of reason, is chiefly to be seen in the creative fine arts, as distinguished from the imitative, the mechanic, and other arts. The musician, the painter, the sculptor, the poet, the novelist and the playwright, so far as they are not imitators, present the best illustrations of the work of the imagination. It is a faculty which must be very little developed in the animals below man. They occasionally make mistakes in the nature of objects, and suppose them to be other than what they are. Thus the Antilocapra supposes the Indian disguised with a skin and horns, to be one of his own species, and suffers the penalty. But this is a most rudimental act of imagination, if it be not mere curiosity.

The reason, properly so-called, begins in its lowest grades with the simplest rearrangement of the objects of sense and memory, in accordance with some principle of relation. As the principle or standard of relation varies, so does the intellectual process. If the process be discovery, or the enlargement of knowledge, many experiences (or hypotheses) will be successively encountered and tested, and appropriate generalizations reached (inductions). If the process be to accomplish the practical ends of life by use of well-known means, the intellect uses the customary rules of action as standards, be they moral or mechanical, financial or political, and attains its deductions and applications. These two types of intellect are strikingly distinct, and produce the most diverse consequences. The inductive type is the most generalized, and hence capable of the largest growth and adaptability, and the widest range of thought. The deductive is the more specialized, the more "practical," but less capable of growth or general thought. Its most remarkable exhibitions are seen in the skill with which some men conduct the game of chess, and corresponding enterprises in real life. Also the ingenuity of mechanical invention, and the wonderful rapidity of calculation which some minds display. In intellectual as in many other vital phenomena, the facility once developed, the active process is often unaccompanied by consciousness in many or even all of its stages.

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[1] NATURALIST, 1883, p. 618.

Rapid and exact control of the muscles in obeying the directions of the mind is essential to the practice of many arts, especially to that of the musician. This accomplishment is acquired through the medium of the conscious mind, and may be regarded simply as the reflex of impressions made on the senses directed by some simple rule which has been impressed on the memory. The often surprising results involve the exercise of a very simple phase of intellection.

The appearance of the rational faculties in time, may be estimated by their relative development in the existing divisions of animals whose period of origin is known or inferred. The animal mind is capable of simple forms of induction and deduction, and sometimes acquires considerable artistic skill. Bees, ants and spiders display these in varying degrees, and their antiquity is probably coëxtensive with that of the known sedimentary rocks. The supposed Ascidian ancestors of the Vertebrata, and even the lowest vertebrate (Branchiostoma), display far less intelligence than the articulates mentioned, which are really lower in the scale of organic types. From such unpromising sources did the noble vertebrate line descend. It is probable that the inductive act preceded by a little the deductive in time, as it does in logical order. But the elaboration of these powers was doubtless long delayed;

for untold ages they involved nothing more than the discovery and application of general principles of the simplest kind; such as the customary sequence of natural phenomena, and the anticipation of their operations, as, for instance, in the laying up of winter provisions. Occasionally deductive application of an old rule to a new case would arise, as in that of the Mygale spider which was observed by Dr. McCook to substitute cotton for her own silk for the lining of her nest. The development of the rational faculty has been rather in quantity and quality, than in the nature of its constituent parts. I may remark, however, that the embryological order is here again different from the palæontological. Inherited aptitudes, as for music, calculation, etc., precede, in children, any considerable powers of thought, while the order of development of the race has been the reverse.

As regards the appearance of the qualities of mind already mentioned, which depend on character of tissue, it is difficult to present an order which shall be generally true. Our ignorance of the subject is profound; nevertheless observation of animals and men leads to the following conclusions : First, the primitive mind is negative, unimpressible, and little sensitive. In evolution, sensibility has been developed under stimuli, and diminished by disuse and repose. The energy of high-strung sensibility has probably ever won for its possessors success in the struggle for existence, and more or less immunity from the pains which stimulate to action.[1] It is true that the non-aggressive and ever-harassed Herbivora have developed the higher brain structure. The inferiority of brain type of the Carnivora is a well-known fact of present and past time. The early ruminants were smaller than the contemporary flesh-eaters, and therefore subject to the greatest risks. The best developed brains, those of the Quadrumana, have been developed in still more defenseless animals, who in their arboreal life have been confronted by still more complex conditions.

Impressibility or sensitiveness has evidently been the means of acquisition of some of the other qualities mentioned. Thus *intensity* may have resulted from active use accompanied by vigorous nutrition, and the consequent construction of compact force-converting tissue. *Rapidity* without intensity must also result from exercise, with a less vigorous construction of tissue.

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[1] The relation of Man to the Tertiary Mammalia, *Penn Monthly*, 1875.

Fineness and *tenacity*, on the other hand, cannot be regarded as being so much produced by use, as by very primitive conditions of tissue. Restraint under pressure might produce fineness. Long continued freedom from sudden changes, under pressure, might account for the origin of tenacious tissue. As to quantity, deficiency or diversion of nutritive energy or material must produce smallness, and the reverse condition, largeness.

These qualities impress themselves on the external as well as the internal organization, and can be more or less successfully discerned by the observer. I reserve the question of physiognomy to a later article, and here consider only the evolutionary bearings of character itself. As in physiognomy, we may arrange the faculties and their qualities under the two heads of ancestral and embryonic, or that of the species and that of the individual. The order of succession is the same in both kinds of development.

SPECIES.	INDIVIDUAL.
Indifference.	*Indifference.*
Emotions.	*Emotions.*
Intellect.	*Intellect.*
a. *Imagination.*	a. *Imagination.*
b. *Reason.*	b. *Reason.*

It is not practicable to go farther than this into the order of evolution of characteristics. There is probably little uniformity of sequence other than that I have already pointed out under the head of the emotions.

As a complex outcome of the emotional and rational faculties, must be now mentioned the moral sense, or the sense of justice. It consists of two elements, the emotion *benevolence*, and the rational power of *discrimination* or judgment. The former furnishes the desire to do what is right to a fellow-being. Without the aid of reason, it is benevolence, not justice, and may often fail of its object. The rational element has acquired from experience a generalization, the law of right. It perceives what is most conducive to the best interest of the object of benevolence in his relation to others or to society, or whether he be a proper object of benevolence at all. By itself, this quality is absolutely useless to mankind. When it guides the action of human sympathy, it displays itself as the most noble of human attributes. Many animals display sympathy and benevolence, but justice has not yet been observed in any of them. Hence it has been said that it cannot be a derivative faculty, but is "intuitive" in man. The objection to this view is its great variability and occasional entire absence in man, individually and racially. It is the last to appear in individual growth, as it has doubtless been in the order of evolution, of mind.

I now devote a little space to the discussion of the distribution of these qualities in races and sexes.

As regards the relative preponderance in action of the emotive and intellectual faculties, it is an axiom that in the great majority of mankind, apart from the necessities imposed by the simple physical instincts, it is a taste or an affection or an emotion that lies at the basis of their activities. Perhaps the most universal is the affection of sex. Given two types of rational beings who are objects of admiration and of pleasure to each other, each of whom desires to possess the other, and who therefore employs many devices to please and attract the other, and we have an effective agent of general development. Then the parental and especially the maternal affections, arouse and direct many labors. Fear of suffering and death is at the basis of many others. The love of power or of possession, including ambition, is a well-known stimulus. The love of beauty is a strong motive in many persons. The pleasure derived from the exercise of the intelligence is a sufficient motive for a life work in a comparatively small number of persons. These are the artists and the scientists; but it is far from being an unmixed motive in many of them.

Intellectual motives, however, enter into association with the affectional in many instances, as for example in the profession of teaching. But it is as guide and agent in the accomplishment of the main ends of life that the intellect, especially the reason, has its great field, and displays itself in an endless variety of ways.

If we now survey men as we find them, it is a general truth that it is in the male sex that the greatest proportion of rational method is to be found, and in the female the greatest proportion of the affectional and emotional. As we descend the scale of humanity, the energy and amount of the rational element grows less and less, while the affectional elements change their proportions. The benevolent and sex elements diminish in force more rapidly than the other sentiments, but it is probable that all the emotions are less active in savages, excepting those of power and of fear. In the lowest races there is a general deficiency of the emotional qualities, excepting fear, a condition which resembles one of the stages of childhood of the most perfect humanity. To this must be added revenge, where hatred may be reinforced by several other sentiments, with a feeble perception of equivalent suffering or punishment, which may or may not be just. The pleasure of muscular exercise is greatly developed in people of out-door habits.

The order of the appearance of the intelligence is nearly dependent on the development of the powers of observation. In most savages these are very acute, and vary according to the nature of the environment which impresses them. The character of most civilizations tends to diminish the power of the perceptive, while the higher departments of imagination and reason are enlarged. The imagination reached a high development before reason had attained much strength. With the exception of a few families, the intelligence of mankind has, up to within two or three centuries, expressed itself in works of the imagination. When exact knowledge first began to be cultivated, it was in the department of astronomy, where the least precision was attainable, and where the greatest scope for the imagination is to be found.[1] Next in time metaphysics was the throne of learning, a field in which much may be said with the least possible reference to the facts of observation. With the modern cultivation of the natural and physical sciences, the perceptive faculties will be restored, it is to be hoped, to their true place, and thus many avenues opened up for the higher thought power of a developed race. Thus it is that in the order of human development there is to be a return to the primitive powers of observation, without loss of the later acquired and more noble capacities of the intellect.

The relation of the qualities of impressibility, fineness, intensity, speed and tenacity to our development, in time, may have been as follows: Impressibility of mind is no doubt an embryonic character of "retardation," parallel and probably a consequence of the retardation which is found in the human skull and face.

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[1] The governments of antiquity required the knowledge of the Chaldean astronomers as important to the success of their undertakings, and the governments of Europe and America were, for a long period, more liberal in their support of astronomy than any other science. At present, however, geology shares in this aid, and to a less degree botany and zoölogy.

The preponderance of the osseous and nutritive elements over the nervous, is the usual accompaniment of non-impressibility, and *vice versa.* Hence this quality is of late origin in the history of the Vertebrata and of man, and is most developed in the young, and better developed in women than in men.

Tenacity has an opposite significance, being an especial characteristic of maturity in the human mind. Hence it may have been more general in early ages than at present, but could have little value so long as the mind remained small in quantity. Curiously it is a quality which may coëxist with a good deal of impressibility.

Fineness can only be a quality of full development, and is totally independent of the other qualities. It is unknown among savages, and is developed apparently in a few animals. Of intensity it is difficult to say much definitely. The nervous operations of animals often display the highest degree of this quality, and it is not unlikely that its appearances differ as much in savages as in civilized people. Its importance in mental action depends of course on the kind and amount of mental function which exhibits it. The same may be said of speed. The faculties which exist are more or less affected by it. In the well formed reason it is an important characteristic, and a special form of development.

Having gone as far into the origin and developmental relation of mental functions and qualities as the nature of this sketch permits, I refer briefly to the stimulus to their growth; always remembering that the percentage of inherited qualities is much larger in a given character than that of acquired ones. On this head one word expresses a good deal, and that word is *use.* No truth is better known than this one, that mental faculties develop with use more rapidly than those of any other organ of the human body. Brain and nerve are apparently the most plastic of all tissues; the one which retains the properties of the primitive protoplasm, multiplied and intensified a thousand fold. It has always been the seat of creation, throwing off its "formed matter" in useful directions. It is still doing so; and in the human brain ever creating itself, is in addition, the seat of a new creation, which it executes through its instruments, the other organs of the body. Hence the greatest sin against the brain is idleness, or disuse. The brain activity of to-day is an indication of health and happiness beyond what the world has seen hitherto.

The greatest stimulus to exercise of the brain is human society. Hence the greatest developments of mind have always been in the centers of population. Whatever may be the passive virtues of country life, it is the cities that furnish both the stimulus and the field for the triumphs of mind.

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OBSERVATIONS ON THE HABITS OF THE AMERICAN CHAMELEON (ANOLIS PRINCIPALIS).

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UNDER all circumstances lizards are interesting creatures, meet them where we may; as one evidence of this, how often do we find them chosen, and that, too, for many ages gone by, as objects to adorn pottery, vases and china, or modeled in silver and gold to be worn as jewelry, or cast in the baser metals for other purposes, such as bronze ornaments. There is something very mysterious, at times, in their very look, their dignified mien, their almost provoking silence; this is changed in us to a sense of curious interest that is quickened as the reptile assumes its livelier air, darts along the tree branch that it may be on, or shoots with the rapidity of an arrow up the trunk of some old tree. This singular interest amounts to positive fascination, as we come to know the anolidae, and I assure you our little American chameleon is one of the most engaging of the group, at the same time, being one of the commonest of all the lizards found throughout the lowlands of Louisiana; indeed, I have known instances of two or three children capturing as many as twenty-five or thirty in some old magnolia grove in the course of an hour or two, and we may well imagine the number that would escape from our juvenile collectors. It is certainly the exception though, that any one ever disturbs or injures, either in city or forest, this inoffensive and harmless little creature; entitled as we are, however, to claim this for ourselves, it must be remembered, and it is a fact not commonly known, that in the town and its immediate neighborhod the chameleon has an uncompromising enemy in the domestic cat. This animal, I have been informed upon undoubted authority, will, when the opportunity presents itself, pass anything, meat, birds, and even fish, if there is the slightest chance of securing one of these lizards, of which they seem to